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(54) Abstract Title
Traffic warning device

(57) A traffic warning device is disposed in vehicles and communicates traffic and accident information to the drivers of nearby vehicles. The device includes a sensing means, control means, and warning means. The control means is arranged to activate the warning means upon the sensing means detecting a predetermined event. The predetermined event may be the vehicle's rate of deceleration exceeding a predefined limit. Alternatively, the predetermined event may be a specific pattern in which the vehicle's brakes are activated or a speed in which the vehicle's brakes are activated. The warning means may activate a visual warning, such as flashing the vehicle's hazard lights or dashboard lights, or activate an audible warning message. Detection of the predetermined event causes the position, speed and direction of the vehicle to be sent by radio to nearby vehicles which compare them with their own values, giving a warning if necessary.

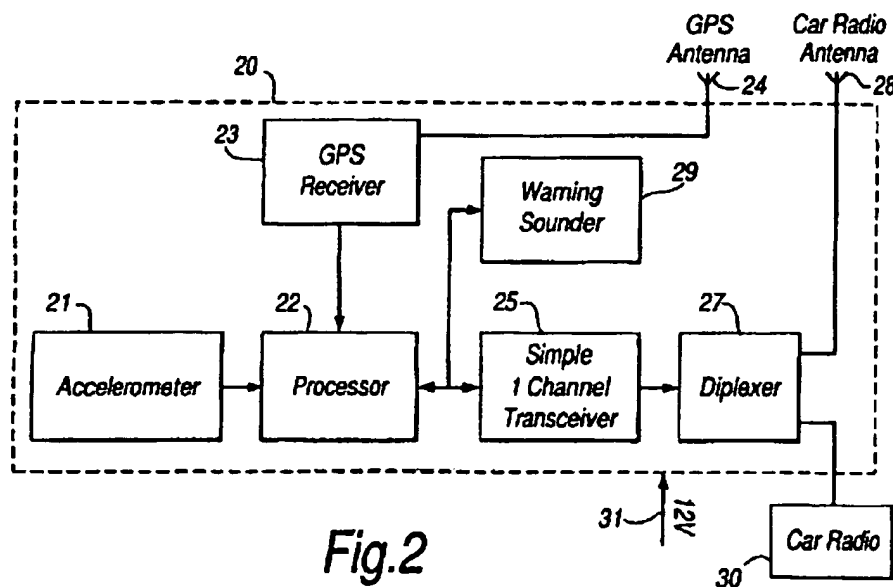
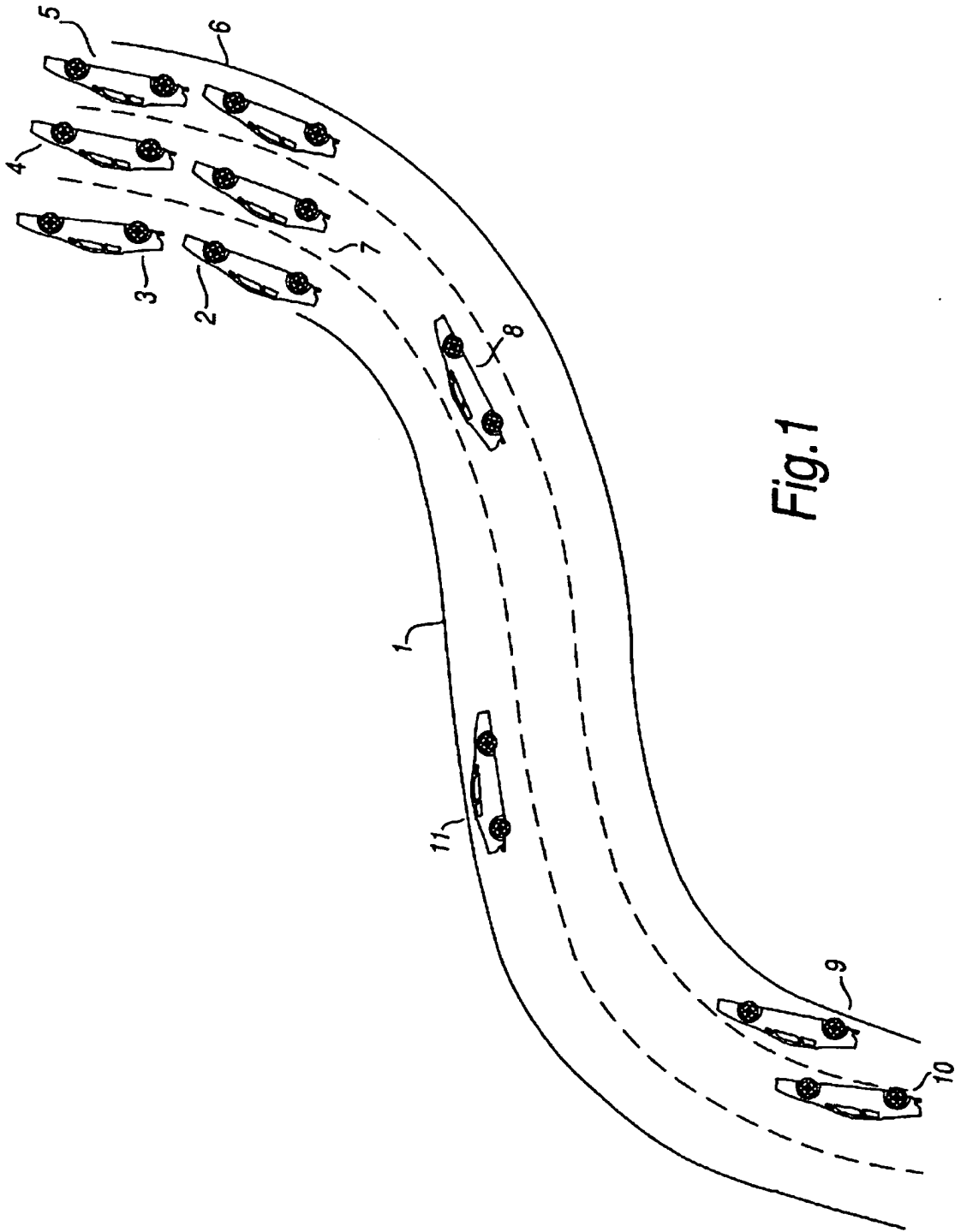


Fig.2



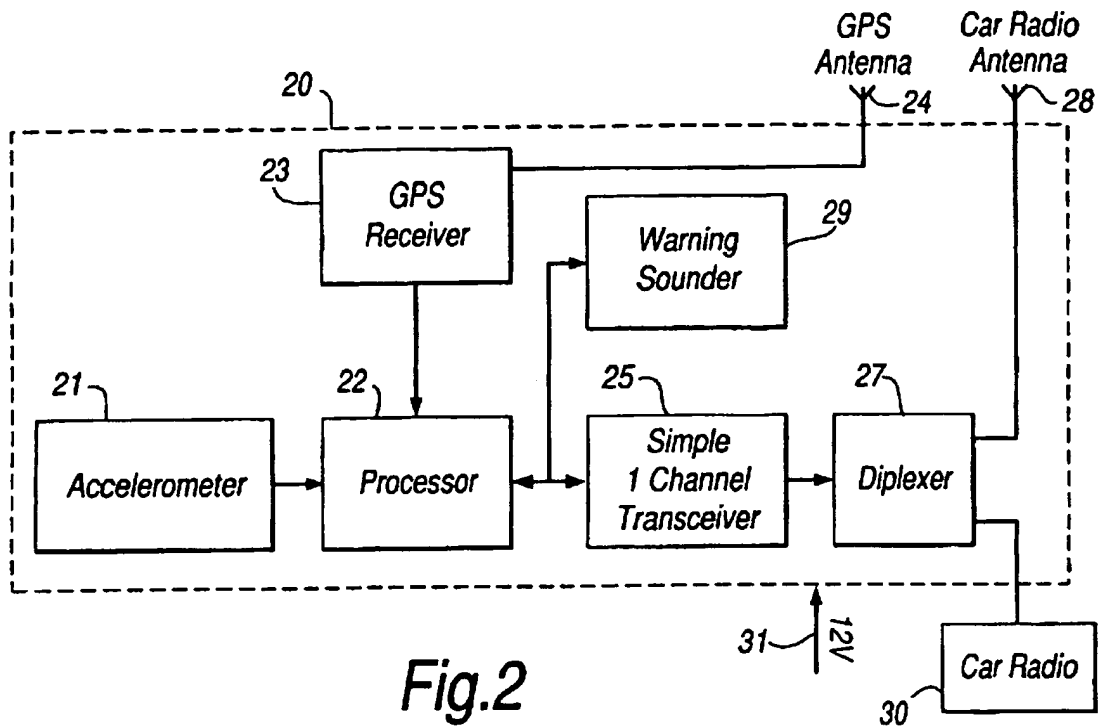


Fig. 2

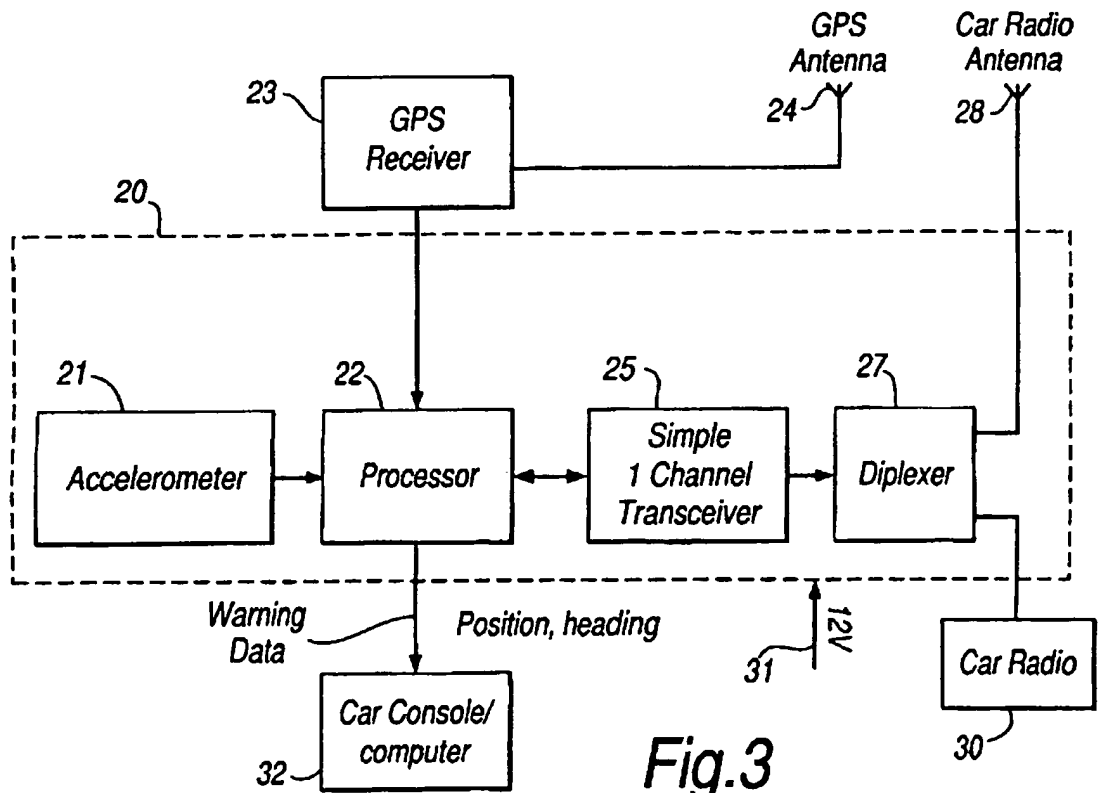


Fig. 3

TRAFFIC WARNING DEVICE

The present invention relates to the field of traffic warning devices. More specifically the present invention relates to a device disposed in a vehicle which communicates traffic and accident information to the drivers of nearby vehicles.

Motorway driving is often hazardous because motorists can either not see far enough ahead to stop or their reaction times are dulled by the monotonous nature of motorway driving. In the event of an accident or slow moving vehicle ahead, traffic can pile up sometimes causing crashes involving many vehicles. As motorways become more congested the risk of being involved in an accident or being delayed due to a prior accident is increasing.

Currently, signs located along the side of motorways inform drivers of delays or accidents on the road ahead. These signs are controlled from a central control station and rely on police or video surveillance for their accuracy. Often they are inaccurate and do little to prevent speeding drivers from crashing into the back of slow moving or stopped traffic ahead.

Brake lights are another safety feature incorporated into all motor vehicles. They serve to alert drivers that the vehicle in front of them is slowing down. However, their usefulness relies on the driver behind leaving sufficient stopping distance between his vehicle and the braking vehicle in front of him. Often this is not the case and an accident results.

The aim of the present invention is to provide drivers with a reliable advanced warning of an accident or slow moving traffic ahead. Early warning of an accident on the road ahead may help to prevent multiple car pile-ups which occur when speeding drivers are unaware of an accident ahead of them and crash into the back of a slow moving or stopped vehicles.

According to the present invention there is provided apparatus for alerting vehicle drivers of a potentially hazardous traffic situation ahead, said apparatus being disposed in a first vehicle and including sensing means, control means, and warning means, said control means being arranged to activate said warning means upon said sensing means detecting a predetermined event.

According an aspect of the present invention said sensing means is an accelerometer and is arranged to determine said first vehicle's rate of deceleration and said predetermined event is said first vehicle's rate of deceleration exceeding a predefined rate of deceleration.

According to an alternative aspect of the present invention said predetermined event is a pattern in which said first vehicle's brakes are activated.

According to a further alternative aspect of the present invention said predetermined event is a response time in which said first vehicle's brakes are activated.

According to a further aspect of the present invention said warning means activates said first vehicle's hazard lights.

According to yet a further aspect of the present invention said apparatus further includes a transceiver means and a position determining means and is arranged such that upon activation of said warning means said position determining means operates to determine a position, speed and direction of said first vehicle and said transceiver means operates to transmit a warning signal which includes said position, direction and speed of said first vehicle.

According to yet a further aspect of the present invention said apparatus is disposed in at least one other vehicle and said transceiver means further operates to receive said warning signal transmitted from said first vehicle, where upon receipt of said warning signal said position determining means operates to determine a position, speed and direction of said at least one other vehicle, and said control means further operates to determine if said position, speed and direction of said at least one other vehicle is within a predefined limit of said position, speed and direction of said first vehicle and thereupon to activate said warning means of said at least one other vehicle.

According to yet a further aspect of the present invention said warning means causes a warning message to be displayed on a display means disposed in said at least one other vehicle, with said warning message indicating to a driver of said at least one other vehicle of a potentially hazardous traffic situation ahead.

Said warning means may activate an audible warning message.

Said position determining means may be a Global Positioning System.

Said warning signal may be an electromagnetic signal.

In a preferred aspect of the present invention said electromagnetic signal is a radio signal.

In yet a further aspect of the present invention said sensing means is arranged to determine if said vehicle's airbag system has been deployed.

According to the present invention there is provided a method for alerting vehicle drivers of a potentially hazardous traffic situation ahead, said method including the steps of sensing a predetermined event in a first vehicle, and activating a warning means.

According to a further method aspect of the present invention said step of sensing a predetermined event is determining said first vehicle's rate of deceleration and determining if said first vehicle's rate of deceleration exceeds a predefined rate of deceleration.

According to an alternative method aspect of the present invention said step of sensing a predetermined event is determining a pattern in which said first vehicle's brakes are activated.

According to another alternative method aspect of the present invention said step of sensing a predetermined event is determining a speed at which said first vehicle's brakes are activated.

According to yet a further method aspect of the present invention said step of activating said warning means further includes the steps of determining a

position, speed and direction of said first vehicle, and transmitting a warning signal which includes said position, speed and direction of said first vehicle.

According to yet a further method aspect of the present invention said method further includes the steps receiving by at least one other vehicle said warning signal transmitted by said first vehicle, determining a position, speed and direction of said at least one other vehicle, determining if said position, speed and direction of said at least one other vehicle is within a predefined limit of said position, speed and direction of said first vehicle, and thereupon activating said warning means of said at least one other vehicle.

Advantageously the present invention provides advanced warning to drivers of potential hazardous traffic situations ahead and enables the drivers to take evasive action. Furthermore, the present invention provides position information to emergency services in the event of an accident occurring.

While the principle advantages and features of the invention have been described above, a greater understanding and appreciation of the invention may be obtained by referring to the following drawings and detailed description of a preferred embodiments, presented by way of example only, in which:-

Figure 1 shows a motorway which a plurality of vehicles travelling on it,

Figure 2 is a diagram of a traffic warning device according to one aspect of the present invention,

Figure 3 is a diagram of a traffic warning device according to a further aspect of the present invention.

In Figure 1 an example of the operation of the present invention is shown. Motorway 1 is shown with several vehicles 2-7 involved in an accident or traffic jam. As vehicle 8 approaches the traffic jam the driver of vehicle 8 brakes rapidly causing the traffic warning device disposed in his vehicle to activate. Vehicles 9 and 10 are not yet in line of sight of the traffic jam and are also fitted with traffic warning devices. The position, direction and speed of braking vehicle 8 is determined and transmitted by its traffic warning device and subsequently received by the traffic warning devices disposed in vehicles 9 and 10. The traffic warning device in vehicles 9 and 10 compare the position, speed and direction of braking vehicle 8 with their own and decides whether or not to issue a warning to the driver of its vehicle of the potential hazard ahead.

The decision to issue a warning message to the drivers of vehicles 9 and 10 is based on the position, speed and direction of the vehicles 9 and 10 and on the position, speed and direction of vehicle 8. As will be appreciated by those skilled in the art other factors such as weather and time of day can also be incorporated into this decision making process.

Emergency vehicle 11 also travelling on motorway 1 and fitted with a traffic warning device receives the position information transmitted by braking

vehicle 8. Emergency vehicle 11 can respond accordingly by either attending the scene themselves or by calling for assistance.

Figure 2 shows a diagram of a preferred embodiment of the traffic warning device according to an aspect of the present invention. In Figure 2 traffic warning device 20 is shown connected to a car radio 30. The traffic warning device 20 can be mounted behind the dashboard close to the car radio 30 or in some other suitable location. The traffic warning device 20 includes a sensing means 21 connected to a processing means 22. In this preferred embodiment the sensing means 21 is an accelerometer. The accelerometer 21 determines the rate of the vehicle's deceleration and communicates this rate to the processing means 22 which determines if the rate of deceleration exceeds a predefined limit. If the predefined rate of deceleration is exceeded the processing means causes a position determining means 23 to determine the position, speed and direction of the vehicle. In this preferred embodiment the positioning determining means 23 is a global positioning system (GPS). The GPS 23 is attached to a GPS antenna 24. The operation of a GPS is well known in the art. Once the position of the vehicle is known, the processing means 22 sends a signal to a transceiver means 25 to transmit a warning signal containing the position of the vehicle.

In an alternative embodiment the sensing means is arranged to detect a specific braking pattern of the vehicle. Studies have shown that the driver of a vehicle will apply the brakes in a specific braking pattern when faced with an

accident situation. In this embodiment the sensing means 21 is arranged to monitor the braking pattern of the vehicle and to communicate this information to the processing means 22. When a predefined braking pattern indicative of an accident situation is detected, the traffic warning device functions as described above with the processing means 22 causing the position determining means 23 to determine the position, speed and direction of the vehicle. Once the position of the vehicle is known, the processing means 22 sends a signal to a transceiver means 25 to transmit a warning signal containing the position of the vehicle.

In yet a further alternative embodiment of the present invention, the sensing means is arranged to detect a response time in which a vehicle's brakes are activated. Studies have shown that the driver of a vehicle will activate the brakes within a specific response time when faced with an accident situation. In this embodiment the sensing means 21 is arranged to detect the response time in which the vehicle's brakes are activated and to communicate this information to the processing means 22. The traffic warning device then functions as described in the previous embodiments.

As will be appreciated by those skilled in the art, other events can be used to trigger the traffic warning device, such as activation of the vehicle's airbag system.

As will be appreciated by those skilled in the art a signal may be transmitted by Diplexer 27 on a radio frequency via the car's radio antenna 28.

The traffic warning device 20 further includes a warning means 29 connected to a processor means 22 and transceiver means 25. The warning means 29 activates a warning message in response to a signal by processor means 22. In this preferred embodiment the warning means sends an audible warning to the driver of the vehicle that a potential hazardous situation is on the motorway ahead. In an alternative embodiment the warning means sends a visual warning. In a further embodiment the warning means 29 activates the vehicles hazard lights. A standard twelve volt car battery 31 powers the traffic warning device 20.

In Figure 3, where parts also appearing in Figure 2 bear identical numerical designation, an alternative embodiment of the present invention is shown. In Figure 3 the GPS positioning means 23 is a standard piece of equipment in the vehicle and not incorporated within the traffic warning device 20. Upon the accelerometer 21 detecting a rapid deceleration processing means 22 activates the GPS 23 to determine the vehicle's position and then instructs transceiver 25 to transmit via car radio antenna 28 a warning message indicating the position, speed and direction of the vehicle. Alternatively, upon said car radio antenna 28 receiving a warning message from another vehicle, processing means 22 compares the position, speed and direction of the vehicle transmitting the warning message to its position, speed and direction, and if the position, speed and direction of the vehicle sending the warning message is within a predefined limit, sends a signal to the car's computer 32 to activate its warning message. As will be appreciated the

warning message may be a verbal warning, or a visual warning such as a flashing of dashboard lights, and/or the activation of the vehicle's hazard lights.

The following scenario will now be given by way of example of a preferred operation of the present invention, with reference to Figures 1, 2, and 3.

Traffic warning devices according to the present invention are disposed in vehicles 8, 9 and 11 as shown in Figure 1. The driver of vehicle 8 upon seeing an accident occur between vehicles 2 –7 decelerates rapidly. The traffic warning device disposed in vehicle 8 senses the rapid deceleration of vehicle 8 and upon determining that the rapid deceleration is beyond a predefined threshold transmits a warning signal containing its position, speed and direction. The traffic warning device disposed in vehicle 9 receives the warning signal and compares the position, speed and direction of the rapidly decelerating vehicle 8 to its own position. If the position is within a predefined limit the traffic warning device activates its warning message to alert the driver of vehicle 9 of the potential hazard ahead. The hazard lights of vehicle 9 are also automatically switched on thereby alerting vehicle 10 which does not have a traffic warning device of the potential hazard ahead. Emergency vehicle 11 also receives the warning signal transmitted by vehicle 8 and responds to the scene of the potential accident.

In an alternative scenario, the traffic warning device disposed in vehicle 8 is configured to detect a specific braking pattern of the vehicle, with said braking pattern being indicative of a typical driver's response to a hazardous traffic

situation. Upon detection of the predefined braking pattern, the traffic warning device transmits a warning signal containing the position, speed and direction of the vehicle. Vehicles 9 and 11 which are also fitted with traffic warning devices, receive the warning signal and after processing means 22 compares the position of the vehicle transmitting the warning signal to its own position, responds accordingly.

Alternatively, the traffic warning device is configured to detect a response time in which said vehicle's braking system is activated, with said response time being that of a typical drivers response to a hazardous traffic situation.

In yet a further alternative embodiment, the traffic warning device is disposed in a programmable roadside traffic sign. Upon receipt of a warning signal, the device causes the roadside traffic sign to flash a suitable warning message to passing vehicles thereby alerting them of a potentially hazardous traffic situation ahead.

As will be appreciated by those skilled in the art, various modifications may be made to the embodiment hereinbefore described without parting from the scope of the present invention.

CLAIMS

1. Apparatus for alerting vehicle drivers of a potentially hazardous traffic situation ahead, said apparatus being disposed in a first vehicle and including:

sensing means, control means, and warning means, said control means being arranged to activate said warning means upon said sensing means detecting a predetermined event.
2. Apparatus as claimed in Claim 1, wherein said sensing means is an accelerometer and is arranged to determine said first vehicle's rate of deceleration and said predetermined event is said first vehicle's rate of deceleration exceeding a predefined rate of deceleration.
3. Apparatus as claimed in Claim 1, wherein said predetermined event is a pattern in which said first vehicle's brakes are activated.
4. Apparatus as claimed in Claim 1, wherein said predetermined event is a response time in which said first vehicle's brakes are activated.
5. Apparatus as claimed in any preceding claim, wherein said warning means activates said first vehicle's hazard lights.
6. Apparatus as claimed in any preceding claim, wherein said apparatus further including a transceiver means and a position determining means and is arranged such that upon activation of said warning means said position determining means operates to determine a position, speed and direction of said first vehicle and said

transceiver means operates to transmit a warning signal which includes said position, speed and direction of said first vehicle.

7. Apparatus as claimed in Claim 6, wherein said apparatus is disposed in at least one other vehicle and said transceiver means further operates to receive said warning signal transmitted from said first vehicle, where upon receipt of said warning signal said position determining means operates to determine a position, speed and direction of said at least one other vehicle, and said control means further operates to determine if said position, speed and direction of said at least one other vehicle is within a predefined limit of said position, speed and direction of said first vehicle and thereupon to activate said warning means of said at least one other vehicle.
8. Apparatus as claimed in Claim 7, wherein said warning means causes a warning message to be displayed on a display means disposed in said at least one other vehicle, with said warning message indicating to a driver of said at least one other vehicle of a potentially hazardous traffic situation ahead.
9. Apparatus as claimed in Claim 7, wherein said warning means activate an audible warning message.
10. Apparatus as claimed in any of Claims 6-9, wherein said position determining means is a Global Positioning System.
11. Apparatus as claimed in any of Claims 6-10, wherein said warning signal is an electromagnetic signal.

12. Apparatus as claimed in Claim 11, wherein said electromagnetic signal is a radio signal.

13. Apparatus as claimed in any preceding claim, wherein said sensing means is arranged to determine if said vehicle's airbag system has been activated.

14. A method for alerting vehicle drivers of a potentially hazardous traffic situation ahead, said method including the steps of:

sensing a predetermined event in a first vehicle, and
activating a warning means.

15. Method as claimed in Claim 14, wherein said step of sensing a predetermined event is determining said first vehicle's rate of deceleration and determining if said first vehicle's rate of deceleration exceeds a predefined rate of deceleration.

16. Method as claimed in Claim 14, wherein said step of sensing a predetermined event is determining a pattern in which said first vehicle's brakes are activated.

17. Method as claimed in Claim 14, wherein said step of sensing a predetermined event is determining a response time in which said first vehicle's brakes are activated.

18. Method as claimed in any preceding Claim 14-17, wherein said step of activating said warning means further includes the steps of:

determining a position, speed and direction of said first vehicle, and

transmitting a warning signal which includes said position, speed and direction of said first vehicle.

19. Method as claimed in Claim 18, wherein said method further includes the steps:

receiving by at least one other vehicle said warning signal transmitted by said first vehicle,

determining a position, speed and direction of said at least one other vehicle,

determining if said position, speed and direction of said at least one other vehicle is within a predefined limit of said position, speed and direction of said first vehicle, and thereupon activating said warning means of said at least one other vehicle.

20. A traffic warning device as hereinbefore described with reference to the accompanying drawings.



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Claims searched: 1-20

Examiner: Mike Davis
Date of search: 8 June 1999

Patents Act 1977
Search Report under Section 17

Databases searched:

UK Patent Office collections, including GB, EP, WO & US patent specifications, in:

UK CI (Ed.Q): G4Q (QCE)

Int CI (Ed.6): G08G

Other:

Documents considered to be relevant:

Category	Identity of document and relevant passage	Relevant to claims
X	GB 2325553 A (AKHTER)	1,14 at least
X	GB 2319124 A (DESIGN TECHNOLOGY & INNOVATION)	"
X	GB 2283353 A (HONDA)	"
X	EP 0817151 A1 (ALCATEL...)	"
X	EP 0773524 A1 (DEUTSCHE TELECOM)	"
X	EP 0631267 A1 (MAGAGNINI ET AL)	"
X	EP 0627719 A2 (MARTINELLO)	"
X	EP 0441576 A2 (BOWMAN)	"
X	WO 93/16453 A1 (LOCHEAD)	"

X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art.
Y	Document indicating lack of inventive step if combined with one or more other documents of same category.	P	Document published on or after the declared priority date but before the filing date of this invention.
&	Member of the same patent family	E	Patent document published on or after, but with priority date earlier than, the filing date of this application.